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**TITLE:** NONINVASIVE TECHNIQUES FOR INTRACRANIAL PRESSURE ASSESSMENT: A REVIEW FROM AEROSPACE MEDICINE PERSPECTIVE

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**PRESENTATION TYPE:** Slide

**CATEGORY:** Space Medicine

**ABSTRACT BODY:**

**Introduction:** Microgravity-induced changes in fluid distribution and other physiological factors due to space flight have been implicated as the cause of increased intracranial pressure (ICP) in a number of space crewmembers. The modest levels of ICP elevation and absence of severe symptoms in this group do not warrant invasive diagnostic interventions. However, the long-term trends and residual or consequential changes secondary to the observed ICP elevation in this group are not yet known. Therefore, close attention is needed to evaluate the potential techniques of noninvasively assessing ICP, including those feasible for in-flight use. Of particular interest is continuity between ground and in-flight testing, whereby data from the same or different techniques allow reasonably dependable estimation of ICP trends and responses.

**Methods:** A thorough review of current literature, analysis of NASA data, and interviews with subject matter experts were conducted to construct a presentation that reflects the state of the art for noninvasive ICP measurement and monitoring.

**Results:** Multiple imaging and non-imaging modalities are available to assess ICP in terrestrial clinical and experimental environments. Imaging alternatives include magnetic resonance imaging (MRI) and high-resolution sonography. Non-imaging techniques include transcranial Doppler, certain audiological methods, and venous ophthalmodynamometry, among others. Special functional techniques have been proposed recently that allow the use of advanced MRI methods to calculate ICP in addition to the acquisition of high-resolution images. Our data include many of these applications, with several cases of correlation with lumbar puncture, the invasive "gold standard" measurement of ICP.

**Learning Objective 1:** To review the available peer-reviewed literature on both clinically accepted and experimental techniques for ICP assessment.

**Learning Objective 2:** To understand the relevance of noninvasive ICP assessment to the practice of aerospace medicine.

**Learning Objective 3:** To learn about noninvasive methodologies available to flight surgeons for the assessment of intracranial pressure in terrestrial conditions and in microgravity.

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